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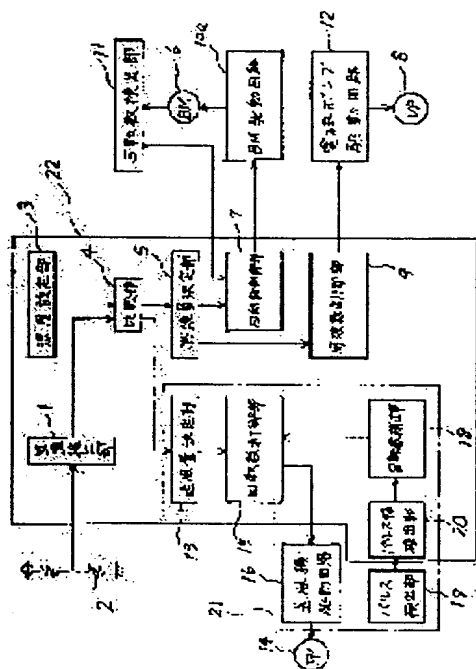
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(54) CONTROLLER FOR BLOWER AND CONTROLLER FOR HOT AIR TYPE HEATER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a controller, by which a fluctuation in a rotational speed of a blower due to a fluctuation in a power source voltage is eliminated and the rotational speed is corrected to the predetermined rotational speed, for a blower.

SOLUTION: A controller is provided with a pulse generating part generating a pulse toward a blower controlling part 21, a pulse width detecting part 20 detecting a width of a pulse generated in the pulse generating unit, and a rotational speed correcting part 18 correcting a rotational speed of a blower 14 on the basis of the output from the pulse width detecting part 20, so that the speed of the blower 14 can be corrected to the constant one even if a power source voltage and the like fluctuates on the basis of the fluctuation quantity of the pulse width.



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CLAIMS

[Claim(s)]

[Claim 1] The detector element which detects temperature, indoor humidity, or indoor dust etc., and the blower which can carry out adjustable [of the rotational frequency], Based on the output of the above-mentioned detector element, it has the blower control section which carries out adjustable [of the rotational frequency of a blower] to the rotational frequency of the multistage story set up beforehand. The above-mentioned blower control section is the control unit of the blower which carries out full wave rectification of the supply voltage, and is characterized by amending so that the width of face of the pulse which was made to generate a pulse and was generated near [the] the zero cross may be measured and it may become said rotational frequency set up beforehand about the rotational frequency of a blower based on this pulse width.

[Claim 2] The temperature detector element which detects indoor temperature, and the air control section which carries out adjustable [of the rotational frequency of the blower motor which supplies a combustion air to a combustor based on the output of a temperature detector element], While having the fuel control section which carries out adjustable [of the fuel supplied to the above-mentioned combustor based on the output of the above-mentioned temperature detector element] The rotational frequency detecting element to which the above-mentioned air control section detects the rotational frequency of the above-mentioned blower motor, It has the revolving-speed-control section which performs feedback control of an engine speed based on the signal of this engine-speed detecting element. It has the blower control section for warm air which carries out adjustable to the rotational frequency of the multistage story beforehand set up according to the combustion condition of said combustor. The above-mentioned blower control section is the control unit of the warm air circulator which carries out full wave rectification of the supply voltage, and is characterized by amending the rotational frequency of a blower to said rotational frequency set up beforehand based on the width of face of the pulse which was made to generate a pulse and was generated near [the] the zero cross.

[Claim 3] The detector element which detects temperature, indoor humidity, or indoor dust etc., and the blower for ventilation which can carry out adjustable [of the rotational frequency], Based on the output of the above-mentioned detector element, it has the blower control section which carries out adjustable [of the rotational frequency of a blower] to the rotational frequency of the multistage story set up beforehand. The above-mentioned blower control section carries out full wave rectification of the supply voltage, and generates a pulse near [the] a zero cross. The control unit of the blower characterized by ** which amends the rotational frequency of a blower based on the signal outputted after fixed time amount on the basis of the width of face of a pulse and stand going up of a pulse which made it generate so that it may become said rotational frequency set up beforehand.

[Claim 4] The temperature detector element which detects indoor temperature, and the air control section which carries out adjustable [of the rotational frequency of the blower motor which supplies a combustion air to a combustor based on the output of a temperature detector element], While having the fuel control

section which carries out adjustable [of the fuel supplied to the above-mentioned combustor based on the output of the above-mentioned temperature detector element] The rotational frequency detecting element to which the above-mentioned air control section detects the rotational frequency of the above-mentioned blower motor, It has the revolving-speed-control section which performs feedback control of an engine speed based on the signal of this engine-speed detecting element. It has the blower control section for warm air which carries out adjustable to the rotational frequency of the multistage story beforehand set up according to the combustion condition of said combustor. The above-mentioned blower control section carries out full wave rectification of the supply voltage, and generates a pulse near [the] a zero cross. The control unit of the warm air circulator characterized by amending the rotational frequency of a blower based on the signal outputted after fixed time amount on the basis of the width of face of a pulse and stand going up of a pulse which made it generate so that it may become said rotational frequency set up beforehand.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the control unit of warm air circulators, such as a control unit of the blower which carries out adjustable [of the rotational frequency] to the rotational frequency of the multistage story set up beforehand, and a kerosene fan heater.

[0002]

[Description of the Prior Art] Generally, warm air circulators, such as a petroleum fan-assisted heater, carry out adjustable [of the combustion level] according to a room temperature, it reaches far and wide and good combustion is obtained. Drawing 11 shows the control-block Fig. of the warm air circulator shown in JP,62-59312,A. The temperature setting section for a user to set up a room temperature, as for the room temperature detecting element to which 1 detects a room temperature through the indoor temperature detector element 2, and 3, The comparator with which 4 measures the output from said both, and 5 are the amount decision sections of combustion which determine the amount of combustion based on the output from this comparator 4, and an output is sent to the revolving-speed-control section 7 of a blower motor 6, and the frequency control section 9 of an electromagnetic pump 8. The revolving-speed-control section 7 of a blower motor 6 takes out a predetermined output in response to this output, and drives a blower motor 6 at a predetermined engine speed through blower motor drive circuit 10a. And the above-mentioned rotational frequency is detected by the rotational frequency detecting element 11, a difference with a setting rotational frequency is fed back to said rotational frequency control section 7, and the rotational frequency is always made to be maintained at a setting rotational frequency.

[0003] On the other hand, if the output from said amount decision section 5 of combustion is undergone, the frequency control section 9 of an electromagnetic pump 8 will carry out adjustable [of the pump drive frequency] to a predetermined value, will supply it to the electromagnetic-pump drive circuit 12, and will drive an electromagnetic pump 8. The blast weight decision section as which 13 determines the blast weight of the blower 14 for warm air based on the output from said comparator 4, and 15 are the revolving-speed-control sections switched to the rotational frequency beforehand decided based on the output from this blast weight decision section 13, and consist of phase angle control circuits. 16 is a blower drive circuit which rotates a blower 14 in response to the output from this revolving-speed-control section 15.

[0004] Moreover, 17 is a supply voltage detecting element which carries out smooth [of the supply voltage] and always detects it, when the smooth detection electrical potential difference turns into below the electrical potential difference set up beforehand, it is equipped with the rotational frequency amendment

section 18 to which amendment [] returns a rotational frequency to an earlier rotational frequency is applied, and it supplies an output to the revolving-speed-control section 15 of a blower 14 with the blast weight decision section 13. Thus, the conventional warm air circulator carries out smooth [] of the supply voltage [], detects it, performs rotational frequency amendment of a blower 14 by change of this smooth supply voltage, and presses down the rotational frequency fluctuation to fluctuation of supply voltage. [0005]

[Problem(s) to be Solved by the Invention] However, since this type of thing has detected the electrical potential difference which lowered the pressure of an AC-power-supply electrical potential difference by the pressure-lowering transformer by the supply voltage detecting element 17, rectified for the diode for rectification, and carried out smooth with the smoothing capacitor, it receives the secondary load effect of a pressure-lowering transformer directly, and changes. moreover, there was change of the detection electrical potential difference by heater each according to the tolerance of the secondary rated voltage of a pressure-lowering transformer, proper rotational frequency amendment was not completed, but the temperature of the heat exchange section rose, it obtained with the flume with which an exhaust gas property gets worse, or blowdown warm air temperature becomes high, and there was a problem.

[0006] This invention is what solved this conventional problem, and rotational frequency fluctuation of the blower by fluctuation of supply voltage is lost, and it aims at making regularity an exhaust gas property and blowdown warm air temperature.

[0007]

[Means for Solving the Problem] The detector element as which this invention detects temperature, indoor humidity, or indoor dust etc., and the blower adjustable [] whose [] a rotational frequency can carry out, In the control unit of the blower equipped with the blower control section which carries out adjustable [] of the rotational frequency of a blower [] to the rotational frequency of the multistage story set up beforehand based on the output of the above-mentioned detector element The above-mentioned blower control section carries out full wave rectification of the supply voltage, measures the width of face of the pulse which was made to generate a pulse and was generated near [] the zero cross, and based on this pulse width, it amends the rotational frequency of a blower so that it may become said rotational frequency set up beforehand.

[0008] Moreover, the temperature detector element as which this invention detects indoor temperature and the air control section which carries out adjustable [] of the rotational frequency of the blower motor which supplies a combustion air to a combustor based on the output of a temperature detector element [], While having the fuel control section which carries out adjustable [] of the fuel supplied to the above-mentioned combustor based on the output of the above-mentioned temperature detector element [] The rotational frequency detecting element to which the above-mentioned air control section detects the rotational frequency of the above-mentioned blower motor, It has the revolving-speed-control section which performs feedback control of an engine speed based on the signal of this engine-speed detecting element. In the control unit of the warm air circulator equipped with the blower control section for warm air which carries out adjustable to the rotational frequency of the multistage story beforehand set up according to the combustion condition of said combustor The above-mentioned blower control section carries out full wave rectification of the supply voltage, and amends the rotational frequency of a blower to said rotational frequency set up beforehand based on the width of face of the pulse which was made to generate a pulse and was generated near [] a zero cross.

[0009] Moreover, the detector element as which this invention detects temperature, indoor humidity, or indoor dust etc., In the control unit of the blower equipped with the blower for ventilation which can carry out adjustable [] of the rotational frequency [], and the blower control section which carries out adjustable [] of the rotational frequency of a blower [] to the rotational frequency of the multistage story set up beforehand based on the output of the above-mentioned detector element The above-mentioned blower control section carries out full wave rectification of the supply voltage, and generates a pulse near [] a zero cross. Based on the signal outputted after fixed time amount on the basis of the width of face of a pulse and stand going up of a pulse which made it generate, the rotational frequency of a blower is amended so that it may become said rotational frequency set up beforehand.

[0010] Furthermore, the temperature detector element as which this invention detects indoor temperature and the air control section which carries out adjustable [] of the rotational frequency of the blower motor which supplies a combustion air to a combustor based on the output of a temperature detector element [], While having the fuel control section which carries out adjustable [] of the fuel supplied to the above-mentioned combustor based on the output of the above-mentioned temperature detector element [] The

rotational frequency detecting element to which the above-mentioned air control section detects the rotational frequency of the above-mentioned blower motor, It has the revolving-speed-control section which performs feedback control of an engine speed based on the signal of this engine-speed detecting element. In the control unit of the warm air circulator equipped with the blower control section for warm air which carries out adjustable to the rotational frequency of the multistage story beforehand set up according to the combustion condition of said combustor The above-mentioned blower control section carries out full wave rectification of the supply voltage, and generates a pulse near [the] a zero cross. Based on the signal outputted after fixed time amount on the basis of the width of face of a pulse and stand going up of a pulse which made it generate, the rotational frequency of a blower is amended so that it may become said rotational frequency set up beforehand.

[0011]

[Embodiment of the Invention]

Below gestalt 1. of operation, although the case where it adopts to the control unit of a warm air circulator as a gestalt 1 of operation of this invention is explained using drawing 1 - drawing 5 , the same part as the conventional example writes the same sign in addition, explanation is omitted, and only a different part is explained. 19 carries out full wave rectification of the supply voltage, it is the pulse generating section which generates a pulse near [that] a zero cross, and both the rotational frequency amendment sections 18 and blast weight decision sections 13 that amend the rotational frequency of a blower 14 in response to the output from the pulse width detecting element 20 which detects change of the width of face of the pulse generated from this pulse generating section 19 supply an output to the revolving-speed-control section 15 of a blower 14.

[0012] And the blower control section 21 consists of the blast weight decision section 13, the revolving-speed-control section 15, the blower drive circuit 16, a pulse detecting element 19, a pulse width detecting element 20, and the rotational frequency amendment section 18. In addition, 22 is a microcomputer which has formed the room temperature detecting element 1, the temperature setting section 3, a comparator 4, the amount decision section 5 of combustion, the revolving-speed-control section 7, the frequency control section 9, the blast weight decision section 13, the revolving-speed-control section 15, the rotational frequency amendment section 18, and the pulse width detecting element 20.

[0013] Hereafter, when the configuration about said rotational frequency amendment is explained using drawing 2 R> 2, for 23, as for a pressure-lowering transformer and 25, AC power supply and 24 are [the diode bridge for full wave rectification and 26] buffers for the snubber circuit for circuit protection and 30 to drive limit resistance, and for the photograph triac coupler section of SSR and 27b drive [a pulse generating circuit and 27a] photodiode 27b of SSR as for the photodiode section of SSR, and 28 and 29, as for 31. 18a is the operation part for rotational frequency amendment in the rotational frequency amendment section 18, and 20a is the operation part for pulse width detection in the pulse width detecting element 20.

[0014] In the above-mentioned configuration, the temperature detected by the temperature detector element 2 is calculated as compared with the temperature set up in the temperature setting section 3, and the optimal amount of combustion and blast weight are determined. And the rotational frequency of a blower motor 6 and the frequency for a drive of an electromagnetic pump 8 are determined by the above-mentioned amount decision of combustion, and it is made to drive through each drive circuit 10a and 12. Moreover, by the above-mentioned blast weight decision, a rotational frequency is determined and a blower 14 is also driven. [0015] Here, it is detected by the pulse width detecting element 20 as change of pulse width, a rotational frequency is amended, and the above-mentioned blower 14 drives the output from the pulse generating section 19 through the blower drive circuit 16.

[0016] Hereafter, rotational frequency amendment actuation of the blower 14 is explained. First, supply voltage VX As the continuous line of drawing 3 I shows, in being normal, as the continuous line of drawing 3 RO shows for the diode 25 for full wave rectification, full wave rectification of the alternating voltage whose pressure was lowered by the transformer 24 is carried out, and a pulse as shown with the reference voltage V near a zero cross as the continuous line of R> drawing 3 3 Ha of pulse width T generates it by the pulse generating circuit 26.

[0017] On the other hand, if supply voltage falls as the broken line of drawing 3 I shows, and it serves as VX1 The pulse width from a pulse generating circuit 26 is T1 as drawing 3 Ha's broken line shows. It becomes. $T < T1$ Operation part 20a for pulse width detection of drawing 2 since it becomes measures pulse width at step 32 of drawing 5 , and then is the supply voltage VX of forward always at step 33. Variation dlatat with pulse width T at the time is computed, and this value is outputted to operation part 18a for

rotational frequency amendment operation part 18 for rotational frequency amendment a, the value of Δt determines a phase angle at step 36, and amendment is applied to the rotational frequency of a blower 14. In this case, as shown in drawing 4, amendment is applied so that it may become the phase angle θ_{X1} smaller than phase angle θ_X of forward always, and it is made for the rotational frequency of a blower 14 to turn into a rotational frequency of forward always.

[0018] In order to carry out full wave rectification of the supply voltage, to generate a pulse and to detect fluctuation of supply voltage by change of the pulse width according to the above-mentioned configuration like [it is ***** with the above explanation and], since the rotational frequency of a blower 14 can always maintain at about 1 law even if a power-source wave is distorted by the secondary load effect of the pressure-lowering transformer 24, the variation of rated voltage, and the outpatient department noise Without an exhaust gas property's getting worse or blowdown warm air temperature becoming high, fixed warm air can obtain and, high moreover, safety can offer a comfortable warm air circulator.

[0019] Moreover, like the case where there is no fluctuation of supply voltage, or drawing 9, with the variation in the secondary electrical potential difference by the tolerance of fluctuation of the secondary load of the pressure-lowering transformer 24, or the rated voltage of a pressure-lowering transformer 24 like drawing 10, since near the peak value of a wave [supply voltage / V_{X2} and V_{X3}] is changed and the wave near reference voltage V is not changed, pulse width T does not change and rotational frequency amendment of a blower 14 is not performed.

[0020] On the other hand, since pulse width T becomes narrow compared with always [forward] when supply voltage rises from always [forward], the rotational frequency amendment section 18 is phase angle θ_X of forward always. Amendment is applied so that it may become a big phase angle, and it is made for the rotational frequency of a blower 14 to become the same as always [forward].

[0021] In addition, with the magnitude of variation Δt of pulse width T , by making operation part 18a for engine-speed amendment of a microcomputer 22 memorize various data from the property of the engine speed of a blower 14 beforehand, very small fluctuation of supply voltage can also be followed and it can be made the configuration which can always obtain a fixed engine speed.

[0022] Although the gestalt 1 of the gestalt 2. above-mentioned implementation of operation showed the gestalt which detects change of pulse width T and amends a rotational frequency As furthermore shown in drawing 6, the timer section 37 started on the basis of stand going up of a pulse which made it generate in the pulse generating section 19 is formed. Based on a mutual value with variation Δt of said pulse width T , it may be made to amend a rotational frequency in inputting into the rotational frequency amendment section 18 the signal outputted after this timer section 37 counts fixed time amount.

[0023] Hereafter, the rotational frequency amendment actuation in this case is explained. First, if the pulse generated in the pulse generating section 19 is inputted into the timer section 37, as shown in drawing 8, stand going up of a pulse will be detected at step 38, and a timer count will be started at step 39.

[0024] After the count of fixed time amount P is completed at step 40, a signal is outputted to the rotational frequency amendment section 18 at step 41. As time amount until it outputs a signal to the rotational frequency amendment section 18 from said timer section 37 is shown in drawing 7, at the time of the fall of supply voltage, only ΔP changes compared with always [forward]. This variation ΔP is computed at step 42, a phase angle is determined in steps 43 and 45 with the value of variation Δt of said pulse width T , and amendment is applied to the rotational frequency of a blower 14. Since carry out full wave rectification of the supply voltage, a pulse is generated, the output of the timer after fixed time amount is detected on the basis of change of the pulse width, and stand going up of a pulse and amendment is applied according to the above-mentioned configuration like [it is ***** with the above explanation and], rotational frequency amendment of the blower 14 accompanying fluctuation of supply voltage can be performed with a sufficient precision to a linear. In addition, although the gestalten 1 and 2 of the above-mentioned implementation explained to the example the case where each amended a rotational frequency about the blower for the warm air of a warm air circulator, they can apply this invention not only to a warm air circulator but to the rotational frequency beforehand set as the multistage story in all the things that control a blower.

[0025]

[Effect of the Invention] According to this invention, full wave rectification of the supply voltage is carried out, a pulse is generated, fluctuation of supply voltage is detected based on change of the pulse width, and in order to apply amendment so that it may become the rotational frequency beforehand set up in the rotational frequency of a blower, even if a power-source wave is distorted by the pressure-lowering transformer

secondary load effect, the variation of rated voltage, and the outpatient department noise, the rotational frequency of a blower can be kept always almost constant.

[0026] In order according to this invention to apply amendment so that it may become the rotational frequency which carried out full wave rectification of the supply voltage, was made to generate a pulse, detected fluctuation of supply voltage based on change of the pulse width, and was beforehand set up in the rotational frequency of a blower, since the rotational frequency of a blower can always maintain at about 1 law even if a power-source wave is distorted by the pressure-lowering transformer secondary load effect, the variation of rated voltage, and the outpatient department noise Without an exhaust gas property's getting worse or blowdown warm air temperature becoming high, fixed warm air can obtain and, high moreover, safety can offer a comfortable warm air circulator.

[0027] Moreover, since according to this invention full wave rectification of the supply voltage is carried out, a pulse is generated and amendment is applied to the rotational frequency of a blower based on the output of the timer after fixed time amount on the basis of change of the pulse width, and stand going up of a pulse Rotational frequency amendment of the blower accompanying fluctuation of supply voltage can be performed with a sufficient precision to a linear, and even if a power-source wave is moreover distorted by pressure-lowering transformer secondary rated voltage tolerance, the load effect, and the outpatient department noise or it carries out, the rotational frequency of a blower can always keep it constant.

[0028] Moreover, since according to this invention full wave rectification of the supply voltage is carried out, a pulse is generated and amendment is applied to the rotational frequency of a blower based on the output of the timer after fixed time amount on the basis of change of the pulse width, and stand going up of a pulse Rotational frequency amendment of the blower accompanying fluctuation of supply voltage can be performed with a sufficient precision to a linear. And since the rotational frequency of a blower can always keep it constant even if a power-source wave is distorted by pressure-lowering transformer secondary rated voltage tolerance, the load effect, and the outpatient department noise, Since fixed warm air can obtain without an exhaust gas property's getting worse or blowdown warm air temperature becoming high, high moreover, safety can offer a comfortable warm air circulator.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The control-block Fig. of the warm air circulator in which the gestalt 1 of implementation of this invention was shown.

[Drawing 2] The circuit diagram of the rotational frequency amendment section in the gestalt 1 of implementation of this invention.

[Drawing 3] I, RO, and Ha are the wave form chart showing the line voltage variation of this invention, and the relation of a full-wave-rectification power source and pulse width change.

[Drawing 4] The wave form chart showing the supply voltage to the blower by phase angle control of this invention.

[Drawing 5] The flow chart which shows the engine-speed amendment actuation in the gestalt 1 of implementation of this invention.

[Drawing 6] The control-block Fig. of the warm air circulator in which the gestalt 2 of implementation of this invention was shown.

[Drawing 7] The explanatory view showing the relation of the change and the timer output signal of the pulse width of this invention.

[Drawing 8] The flow chart which shows the engine-speed amendment actuation in the gestalt 2 of implementation of this invention.

[Drawing 9] The explanatory view showing the wave of the supply voltage by the secondary load effect of a pressure-lowering transformer.

[Drawing 10] The explanatory view showing the variation in the supply voltage by the tolerance of the secondary rated voltage of a pressure-lowering transformer.

[Drawing 11] The control-block Fig. of the conventional warm air circulator.

[Description of Notations]

2 Temperature Detector Element

10 Air Control Section

12 Fuel Control Section

18 Rotational Frequency Amendment Section

19 Pulse Detecting Element

20 Pulse Width Detecting Element

21 Blower Control Section

22 Microcomputer

37 Timer Section

[Translation done.]

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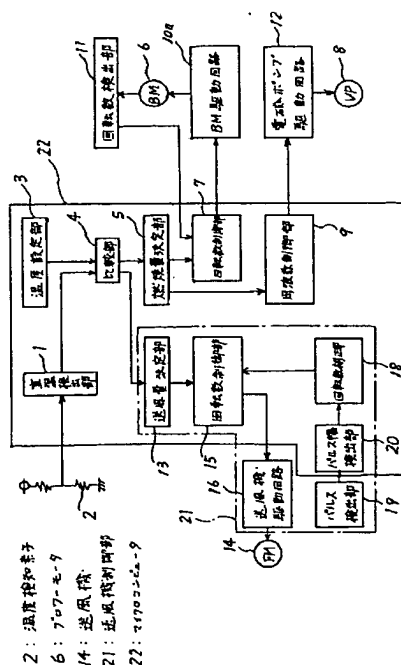
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(54)【発明の名称】 送風機の制御装置、及び温風暖房機の制御装置

(57)【要約】

【課題】 電源電圧の変動による送風機の回転数変動をなくし、回転数をあらかじめ設定された回転数に補正できるようにした送風機の制御装置を得ることを目的とする。

【解決手段】 送風機制御部21にパルスが発生するパルス発生部と、このパルス発生部で発生させたパルスの幅を検出するパルス幅検出部20と、そこからの出力によって送風機14の回転数を補正する回転数補正部18とを設け、パルス幅の変化量に基づいて電源電圧等の変動があっても送風機14の回転数がほぼ一定になるよう補正できるようにした。



【特許請求の範囲】

【請求項 1】 室内の温度や湿度あるいは埃等を検知する検知素子と、回転数が可変できる送風機と、上記検知素子の出力に基づいて送風機の回転数をあらかじめ設定された多段階の回転数に可変する送風機制御部とを備え、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅を測定して該パルス幅に基づいて送風機の回転数を前記あらかじめ設定された回転数になるように補正することを特徴とする送風機の制御装置。

【請求項 2】 室内の温度を検知する温度検知素子と、温度検知素子の出力に基づいて燃焼器へ燃焼空気を供給するブロワーモータの回転数を可変する空気制御部と、上記温度検知素子の出力に基づいて上記燃焼器へ供給する燃料を可変する燃料制御部を有するとともに、上記空気制御部は上記ブロワーモータの回転数を検出する回転数検出部と、この回転数検出部の信号に基づいて回転数のフィードバック制御を行う回転数制御部を有し、前記燃焼器の燃焼状態に応じてあらかじめ設定された多段階の回転数に可変する温風用の送風機制御部とを備え、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅に基づいて送風機の回転数を前記あらかじめ設定された回転数に補正することを特徴とする温風暖房機の制御装置。

【請求項 3】 室内の温度や湿度あるいは埃等を検知する検知素子と、回転数が可変できる送風用の送風機と、上記検知素子の出力に基づいて送風機の回転数をあらかじめ設定された多段階の回転数に可変する送風機制御部とを備え、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅とパルスの立ち上りを基準にして一定時間後に出力される信号とに基づいて送風機の回転数を前記あらかじめ設定された回転数になるように補正するとを特徴とする送風機の制御装置。

【請求項 4】 室内の温度を検知する温度検知素子と、温度検知素子の出力に基づいて燃焼器へ燃焼空気を供給するブロワーモータの回転数を可変する空気制御部と、上記温度検知素子の出力に基づいて上記燃焼器へ供給する燃料を可変する燃料制御部を有するとともに、上記空気制御部は上記ブロワーモータの回転数を検出する回転数検出部と、この回転数検出部の信号に基づいて回転数のフィードバック制御を行う回転数制御部を有し、前記燃焼器の燃焼状態に応じてあらかじめ設定された多段階の回転数に可変する温風用の送風機制御部とを備え、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅とパルスの立ち上りを基準にして一定時間後に出力される信号とに基づいて送風機の回転数を前記あらかじめ設定された回転数になるように補正することを特徴とする温風暖房機の制御装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は回転数をあらかじめ設定された多段階の回転数に可変する送風機の制御装置および石油ファンヒーター等の温風暖房機の制御装置に関するものである。

【0002】

【従来の技術】一般に石油ファンヒーター等の温風暖房機は室温に応じて燃焼レベルを可変し、広範囲にわたって良好な燃焼が得られるようになっている。図 11 は特開昭 62-59312 号公報に示された温風暖房機の制御ブロック図を示し、1 は室内の温度検知素子 2 を介して室温を検出する室温検出部、3 は室温を使用者が設定するための温度設定部、4 は前記両者からの出力を比較する比較部、5 はこの比較部 4 からの出力に基づいて燃焼量を決定する燃焼量決定部で、ブロワーモータ 6 の回転数制御部 7 ならびに電磁ポンプ 8 の周波数制御部 9 に出力を送る。ブロワーモータ 6 の回転数制御部 7 はこの出力を受けて所定の出力を出し、ブロワーモータ駆動回路 10a を介してブロワーモータ 6 を所定の回転数で駆動する。そして、回転数検出部 11 で上記回転数を検出し、設定回転数との差を前記回転数制御部 7 にフィードバックして常に回転数が設定回転数に保たれるようにしている。

【0003】一方、電磁ポンプ 8 の周波数制御部 9 は前記燃焼量決定部 5 からの出力を受けると、ポンプ駆動周波数を所定値に可変して電磁ポンプ駆動回路 12 に供給し、電磁ポンプ 8 を駆動する。13 は前記比較部 4 からの出力に基づいて温風用送風機 14 の送風量を決定する送風量決定部、15 はこの送風量決定部 13 からの出力に基づいてあらかじめ決められた回転数に切替える回転数制御部で、位相角制御回路で構成してある。16 はこの回転数制御部 15 からの出力を受けて送風機 14 を回転させる送風機駆動回路である。

【0004】また 17 は電源電圧を平滑して常に検出する電源電圧検出部であり、その平滑検出電圧があらかじめ設定された電圧以下になった場合に回転数を初期の回転数に戻すような補正をかける回転数補正部 18 を備え、送風量決定部 13 とともに送風機 14 の回転数制御部 15 に出力を供給するようになっている。このように、従来の温風暖房機は、電源電圧を平滑して検出し、この平滑電源電圧の変化により送風機 14 の回転数補正を行い、電源電圧の変動に対する回転数変動をおさえる。

【0005】

【発明が解決しようとする課題】しかしながら、このタイプのものは、電源電圧検出部 17 で交流電源電圧を降圧トランスで降圧し、整流用ダイオードで整流し、平滑コンデンサで平滑した電圧を検出しているため、降圧トランスの二次側負荷変動を直接受け、変化する。また降

圧トランスの二次側定格電圧の公差により暖房機個々による検出電圧の変化があり、適正な回転数補正ができず、熱交換部の温度が上昇し、排ガス特性が悪化した、吹き出し温風温度が高くなったりするといった問題があった。

【0006】本発明はかかる従来の問題を解決したもので、電源電圧の変動による送風機の回転数変動をなくし、排ガス特性及び吹き出し温風温度を一定にすることを目的としたものである。

【0007】

【課題を解決するための手段】本発明は、室内の温度や湿度あるいは埃等を検知する検知素子と、回転数が可変できる送風機と、上記検知素子の出力に基づいて送風機の回転数をあらかじめ設定された多段階の回転数に可変する送風機制御部とを備えた送風機の制御装置において、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅を測定して該パルス幅に基づいて送風機の回転数を前記あらかじめ設定された回転数になるように補正するものである。

【0008】また、本発明は室内の温度を検知する温度検知素子と、温度検知素子の出力に基づいて燃焼器へ燃焼空気を供給するブロワーモータの回転数を可変する空気制御部と、上記温度検知素子の出力に基づいて上記燃焼器へ供給する燃料を可変する燃料制御部を有するとともに、上記空気制御部は上記ブロワーモータの回転数を検出する回転数検出部と、この回転数検出部の信号に基づいて回転数のフィードバック制御を行う回転数制御部を有し、前記燃焼器の燃焼状態に応じてあらかじめ設定された多段階の回転数に可変する温風用の送風機制御部とを備えた温風暖房機の制御装置において、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅に基づいて送風機の回転数を前記あらかじめ設定された回転数に補正するものである。

【0009】また、本発明は、室内の温度や湿度あるいは埃等を検知する検知素子と、回転数が可変できる送風用の送風機と、上記検知素子の出力に基づいて送風機の回転数をあらかじめ設定された多段階の回転数に可変する送風機制御部とを備えた送風機の制御装置において、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅とパルスの立ち上りを基準にして一定時間後に出力される信号とに基づいて送風機の回転数を前記あらかじめ設定された回転数になるように補正するものである。

【0010】さらに、本発明は、室内の温度を検知する温度検知素子と、温度検知素子の出力に基づいて燃焼器へ燃焼空気を供給するブロワーモータの回転数を可変する空気制御部と、上記温度検知素子の出力に基づいて上記燃焼器へ供給する燃料を可変する燃料制御部を有する

とともに、上記空気制御部は上記ブロワーモータの回転数を検出する回転数検出部と、この回転数検出部の信号に基づいて回転数のフィードバック制御を行う回転数制御部を有し、前記燃焼器の燃焼状態に応じてあらかじめ設定された多段階の回転数に可変する温風用の送風機制御部とを備えた温風暖房機の制御装置において、上記送風機制御部は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させ、発生させたパルスの幅とパルスの立ち上りを基準にして一定時間後に出力される信号とに基づいて送風機の回転数を前記あらかじめ設定された回転数になるように補正するものである。

【0011】

【発明の実施の形態】

実施の形態 1. 以下、本発明の実施の形態 1 として温風暖房機の制御装置へ採用した場合を図 1～図 5 を用いて説明するが、従来例と同一部分は同一符号を付記して説明は省略し、異なる部分のみ説明する。19 は電源電圧を全波整流し、そのゼロクロス付近でパルスが発生させるパルス発生部であり、このパルス発生部 19 から発生するパルスの幅の変化を検出するパルス幅検出部 20 からの出力を受けて送風機 14 の回転数を補正する回転数補正部 18 と送風量決定部 13 はともに送風機 14 の回転数制御部 15 に出力を供給するようになっている。

【0012】そして送風量決定部 13、回転数制御部 15、送風機駆動回路 16、パルス検出部 19、パルス幅検出部 20、回転数補正部 18 で送風機制御部 21 を構成している。なお、22 は室温検出部 1、温度設定部 3、比較部 4、燃焼量決定部 5、回転数制御部 7、周波数制御部 9、送風量決定部 13、回転数制御部 15、回転数補正部 18、パルス幅検出部 20 を設けているマイクロコンピュータである。

【0013】以下、前記回転数補正についての構成を図 2 を用いて説明していくと、23 は交流電源、24 は降圧トランス、25 は全波整流用ダイオードブリッジ、26 はパルス発生回路、27a は SSR のフォトトライアックカブラ部、27b は SSR のフォトダイオード部、28、29 は回路保護用スナバー回路、30 は制限抵抗、31 は SSR のフォトダイオード 27b をドライブするためのバッファである。18a は回転数補正部 18 内の回転数補正用演算部、20a はパルス幅検出部 20 内のパルス幅検出用演算部である。

【0014】上記構成において、温度検知素子 2 により検出された温度は、温度設定部 3 で設定された温度と比較、演算され、最適な燃焼量及び送風量が決定される。そして、上記燃焼量決定によりブロワーモータ 6 の回転数及び電磁ポンプ 8 の駆動用周波数が決定され、それぞれの駆動回路 10a、12 を介して駆動させる。また、上記送風量決定によって送風機 14 も回転数が決定され、駆動される。

【0015】ここで、上記送風機 14 はパルス発生部 1

9からの出力をパルス幅検出部20によりパルス幅の変化として検出され、回転数が補正され、送風機駆動回路16を通じて駆動される。

【0016】以下、その送風機14の回転数補正動作について説明していく。まず、電源電圧 V_x が図3イの実線で示すように、正常な場合には、トランス24で降圧された交流電圧は全波整流用ダイオード25で図3ロの実線で示すように、全波整流され、パルス発生回路26により、ゼロクロス付近の基準電圧 V でパルス幅 T の図3ハの実線で示すようなパルスが発生する。

【0017】一方、電源電圧が図3イの破線で示すように低下して V_{x1} となると、パルス発生回路26からのパルス幅は図3ハの破線で示すように T_1 となり、 $T < T_1$ となることから、図2のパルス幅検出用演算部20aは図5のステップ32でパルス幅を測定し、次にステップ33で正常時の電源電圧 V_x 時のパルス幅 T との変化量 Δt を算出し、この値を回転数補正用演算部18aに出力する。回転数補正用演算部18aでは、 Δt の値によりステップ36で位相角を決定し、送風機14の回転数に補正をかける。この場合には図4に示すように正常時の位相角 θ_x より小さな位相角 θ_{x1} になるように補正をかけ、送風機14の回転数が正常時の回転数になるようにする。

【0018】以上の説明で明かなように上記の構成によれば、電源電圧を全波整流してパルスが発生させ、そのパルス幅の変化で電源電圧の変動を検出するため、降圧トランス24の二次側の負荷変動や定格電圧のバラツキ、外来ノイズによって電源波形が歪んだりしても、送風機14の回転数が常にほぼ一定に保つことができるため、排ガス特性が悪化したり、吹き出し温風温度が高くなったりすることなく、一定の温風が得ることができ、安全性が高く、しかも快適な温風暖房機を提供することができる。

【0019】また、電源電圧の変動がない場合や図9のように降圧トランス24の二次側負荷の変動や図10のような降圧トランス24の定格電圧の公差による二次側電圧のバラツキなどでは、電源電圧 V_{x1} 、 V_{x2} は波形のピーク値付近が変動し、基準電圧 V 付近での波形は変動しないので、パルス幅 T は変化せず、送風機14の回転数補正は行われることはない。

【0020】一方、電源電圧が正常時より上昇した場合は、パルス幅 T は正常時に比べてせまくなるので、回転数補正部18は正常時の位相角 θ_x より大きな位相角になるように補正をかけ、送風機14の回転数が正常時と同じになるようにする。

【0021】なお、パルス幅 T の変化量 Δt の大きさにより、あらかじめ送風機14の回転数の特性からマイクロコンピュータ22の回転数補正用演算部18aに多種のデータを記憶させておくことにより、電源電圧の微少な変動にも追従でき、常に一定の回転数を得ることがで

きる構成にすることができる。

【0022】実施の形態2、上記実施の形態1では、パルス幅 T の変化を検出し、回転数を補正する形態を示したが、さらに図6に示すように、パルス発生部19で発生させたパルスの立ち上りを基準にしてスタートするタイマー部37を設け、このタイマー部37が一定時間をカウントした後に出力する信号を回転数補正部18に入力することで、前記パルス幅 T の変化量 Δt との相互の値に基づいて回転数の補正を行うようにしてもよい。

【0023】以下、この場合の回転数補正動作について説明していく。まず、パルス発生部19で発生したパルスがタイマー部37に入力されると図8に示すように、ステップ38でパルスの立ち上りが検出され、ステップ39でタイマーカウントが開始される。

【0024】ステップ40で一定時間 P のカウントが終了すると、ステップ41で回転数補正部18に信号が出力される。前記タイマー部37から回転数補正部18に信号を出力するまでの時間は図7に示すように、電源電圧の低下時には正常時に比べ、 ΔP だけ変化する。この変化量 ΔP をステップ42で算出し、前記パルス幅 T の変化量 Δt の値とともにステップ43及び45において位相角を決定し、送風機14の回転数に補正をかける。以上の説明で明かなように上記の構成によれば、電源電圧を全波整流してパルスが発生させ、そのパルス幅の変化とパルスの立ち上りを基準にして一定時間後のタイマーの出力を検出して補正をかけるので、電源電圧の変動に伴う送風機14の回転数補正を精度よくリニアに行うことができる。なお、上記実施の形態1、2はいずれも、温風暖房機の温風用の送風機について回転数の補正を行う場合を例に説明したが、本発明は温風暖房機に限らず、あらかじめ多段階に設定された回転数に送風機を制御するもの全てにおいて適用できるものである。

【0025】

【発明の効果】本発明によれば、電源電圧を全波整流してパルスが発生させ、そのパルス幅の変化に基づいて電源電圧の変動を検出し、送風機の回転数をあらかじめ設定された回転数になるよう補正をかけるため、降圧トランス二次側の負荷変動や定格電圧のバラツキ、外来ノイズによって電源波形が歪んだりしても、送風機の回転数を常にほぼ一定に保つことができる。

【0026】本発明によれば、電源電圧を全波整流してパルスが発生させ、そのパルス幅の変化に基づいて電源電圧の変動を検出し、送風機の回転数をあらかじめ設定された回転数になるよう補正をかけるため、降圧トランス二次側の負荷変動や定格電圧のバラツキ、外来ノイズによって電源波形が歪んだりしても、送風機の回転数が常にほぼ一定に保つことができるため、排ガス特性が悪化したり、吹き出し温風温度が高くなったりすることなく、一定の温風が得ることができ、安全性が高く、しかも快適な温風暖房機を提供することができる。

【0027】また、本発明によれば、電源電圧を全波整流してパルスが発生させ、そのパルス幅の変化とパルスの立ち上りを基準にして一定時間後のタイマーの出力に基づいて送風機の回転数に補正をかけるので、電源電圧の変動に伴う送風機の回転数補正を精度よくリニアに行うことができ、しかも降圧トランス二次側の定格電圧公差や負荷変動、外来ノイズによって電源波形が歪んだりしても送風機の回転数が常に一定に保つことができる。

【0028】また、本発明によれば、電源電圧を全波整流してパルスが発生させ、そのパルス幅の変化とパルスの立ち上りを基準にして一定時間後のタイマーの出力に基づいて送風機の回転数に補正をかけるので、電源電圧の変動に伴う送風機の回転数補正を精度よくリニアに行うことができ、しかも降圧トランス二次側の定格電圧公差や負荷変動、外来ノイズによって電源波形が歪んだりしても送風機の回転数が常に一定に保つことができるため、排ガス特性が悪化したり、吹き出し温風温度が高くなったりすることなく、一定の温風が得ることができるので、安全性が高く、しかも快適な温風暖房機を提供することができる。

【図面の簡単な説明】

【図1】この発明の実施の形態1を示した温風暖房機の制御ブロック図。

【図2】この発明の実施の形態1における回転数補正部の回路図。

【図3】イ、ロ、ハはこの発明の電源電圧変動と全波整*

* 流電源、パルス幅変化の関係を示す波形図。

【図4】この発明の位相角制御による送風機への供給電圧を示す波形図。

【図5】この発明の実施の形態1における回転数補正動作を示すフローチャート。

【図6】この発明の実施の形態2を示した温風暖房機の制御ブロック図。

【図7】この発明のパルス幅の変化とタイマー出力信号との関係を示す説明図。

10 【図8】この発明の実施の形態2における回転数補正動作を示すフローチャート。

【図9】降圧トランスの2次側負荷変動による電源電圧の波形を示す説明図。

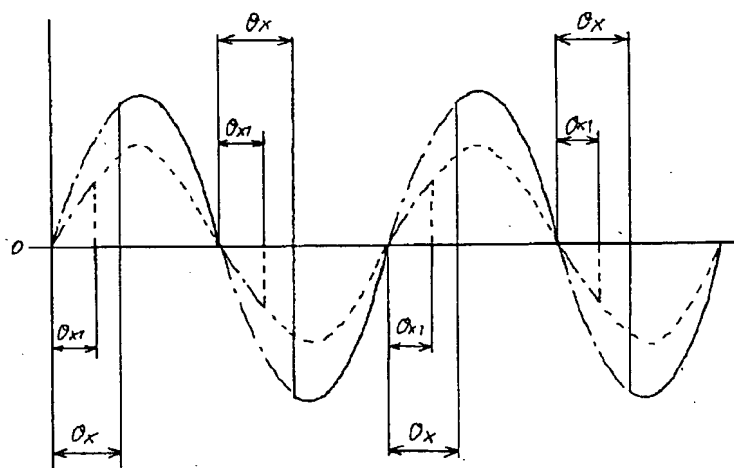
【図10】降圧トランスの2次側定格電圧の公差による電源電圧のバラツキを示す説明図。

【図11】従来の温風暖房機の制御ブロック図。

【符号の説明】

- 2 温度検知素子
- 10 空気制御部
- 20 12 燃料制御部
- 18 回転数補正部
- 19 パルス検出部
- 20 パルス幅検出部
- 21 送風機制御部
- 22 マイクロコンピュータ
- 37 タイマー部

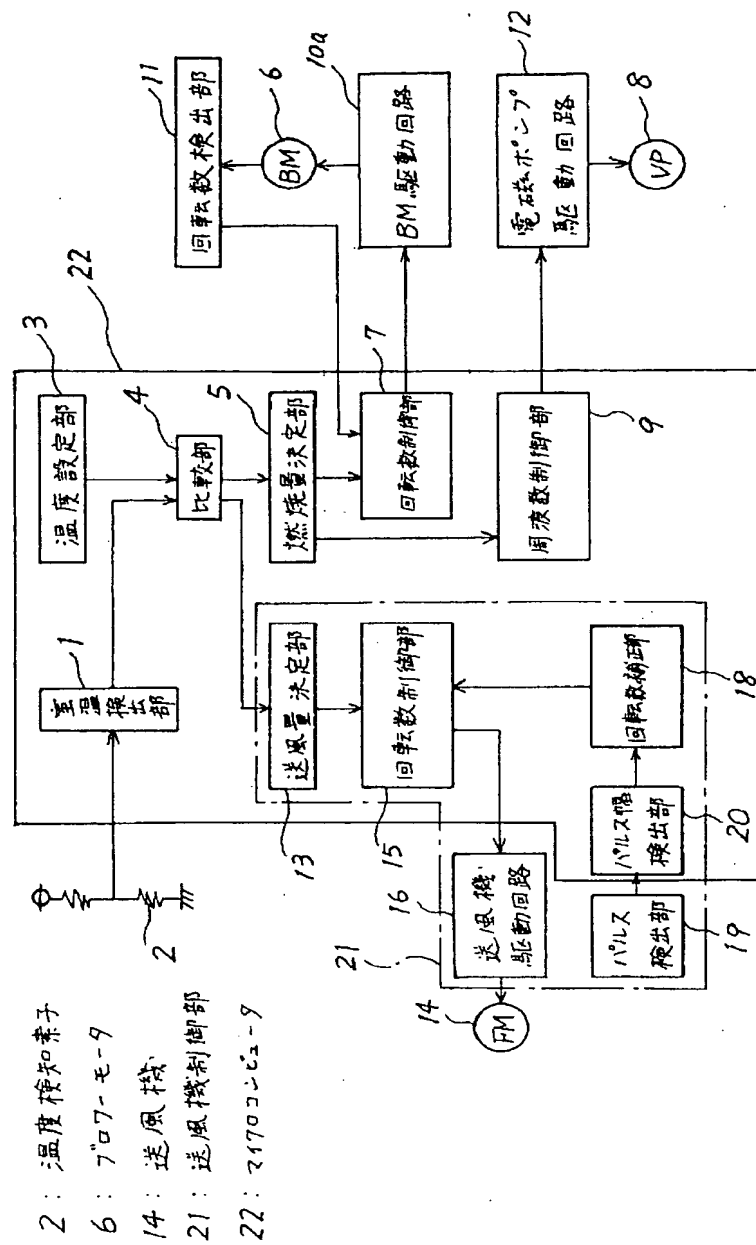
【図4】



θ_x : 電源電圧正常時の位相角

θ_{x1} : 電源電圧低下時の位相角

〔図1〕



2: 温度検知素子

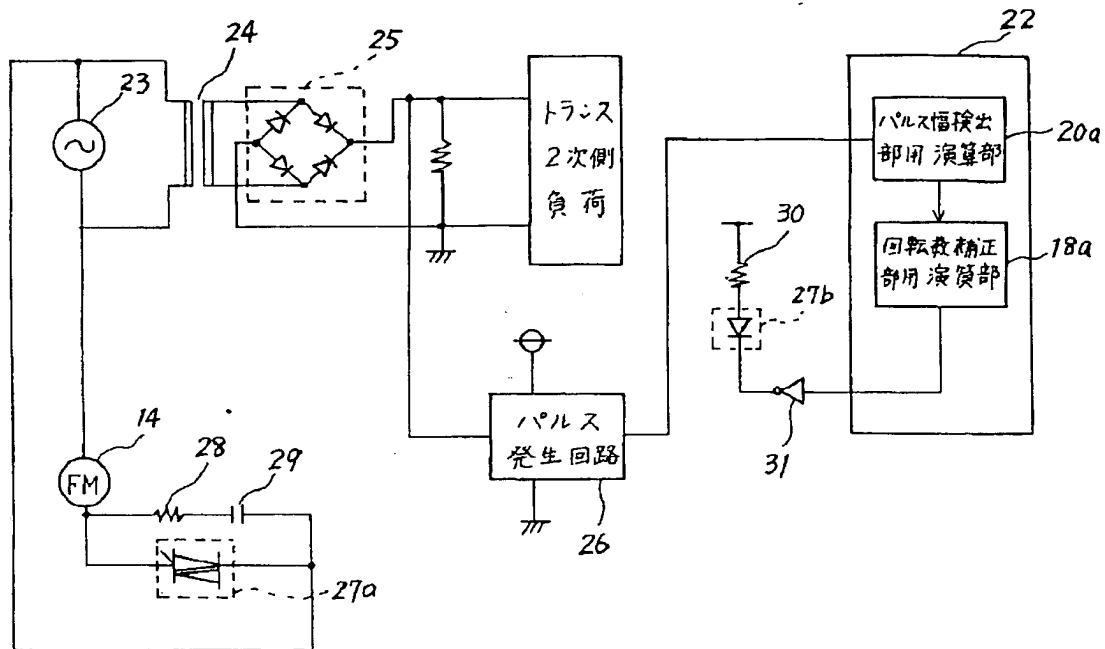
6: 707-モ-9

14: 送風機

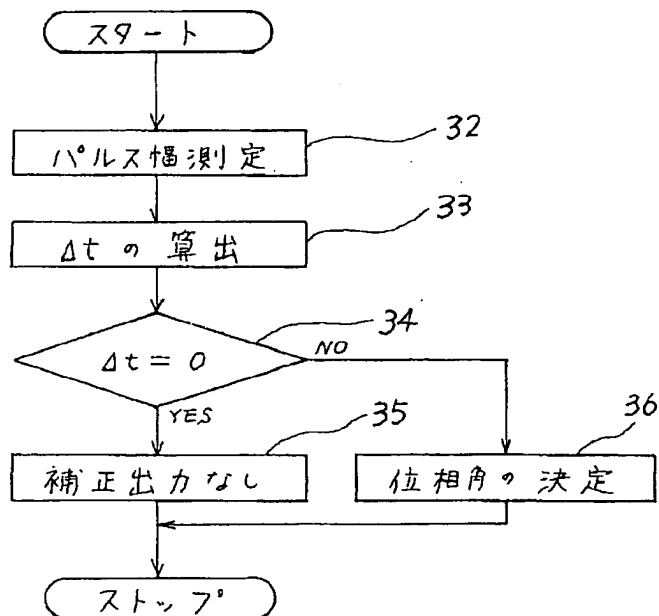
21: 送風機制御部

22: 2170コン-9

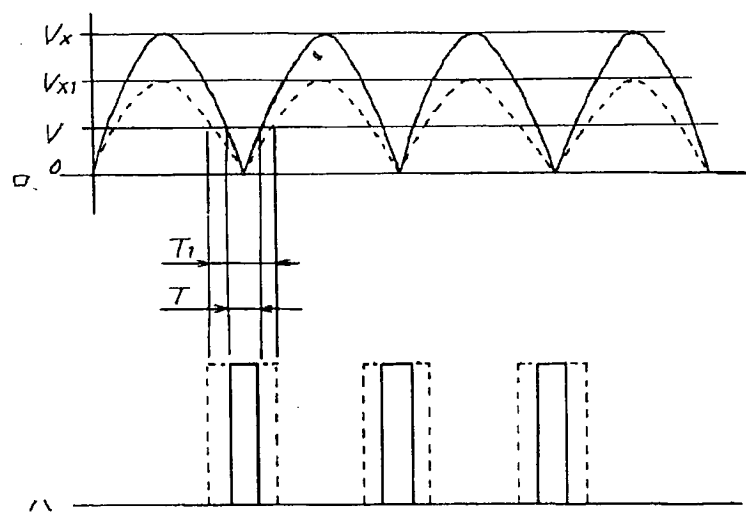
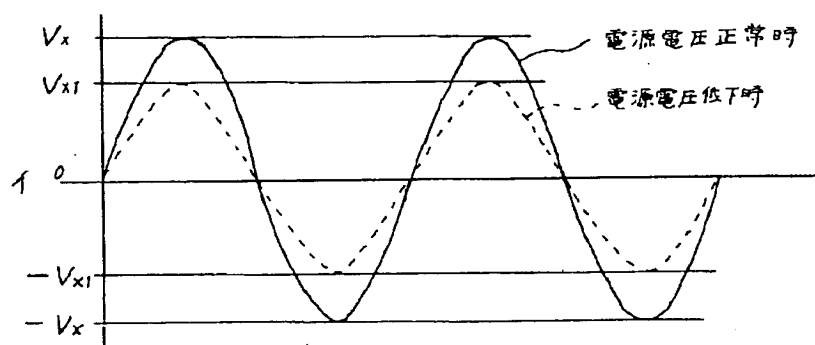
【図2】



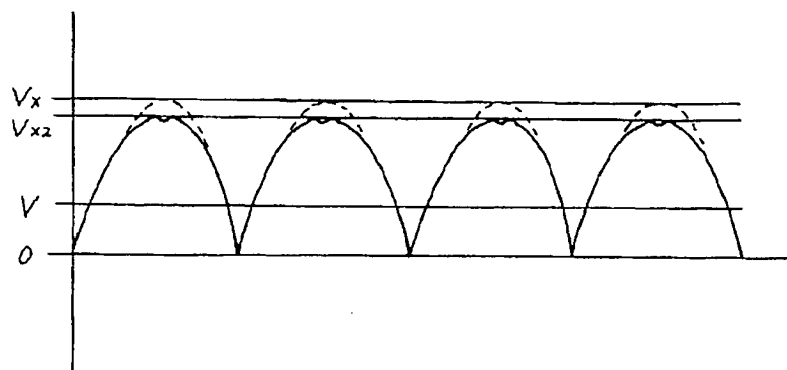
【図5】



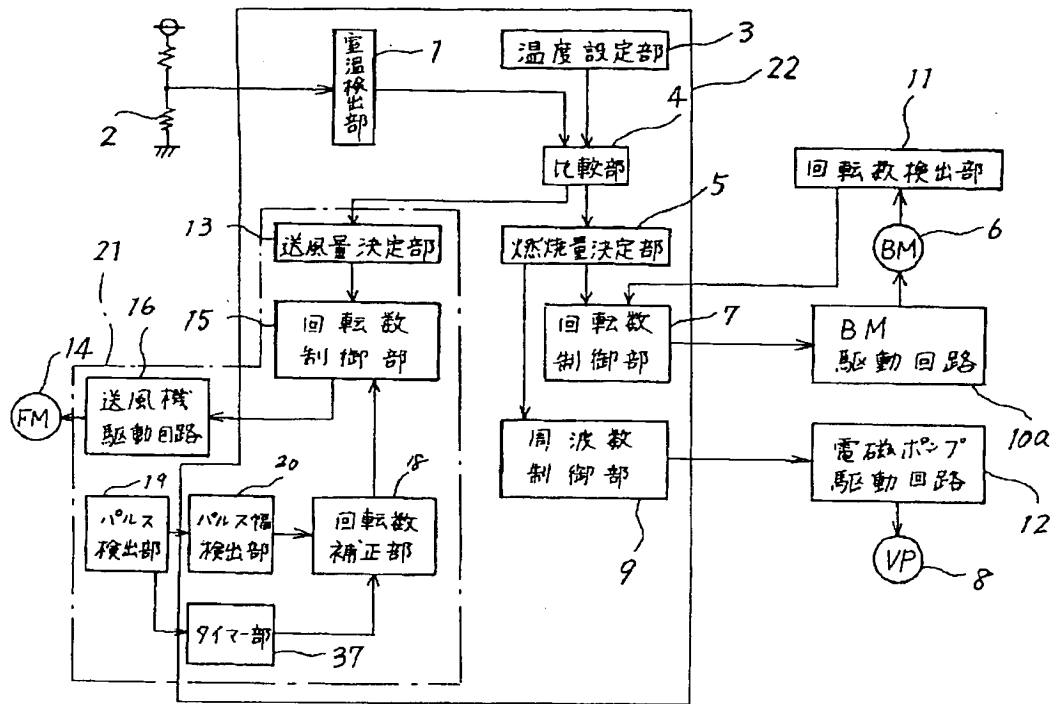
【圖3】



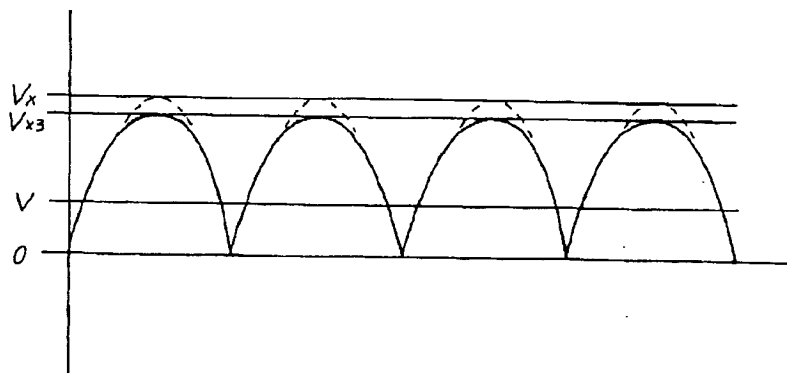
【圖9】



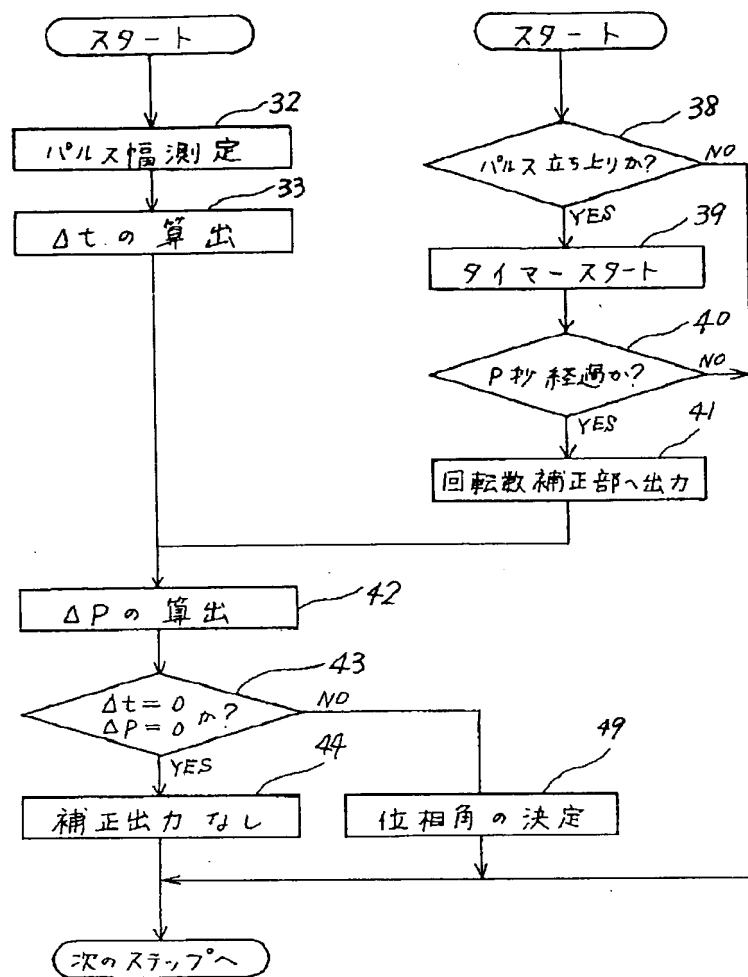
【図6】



【図10】



【図8】



【図11】

